REMARKS

Independent Claim 10 is amended herein to state that the monomer mixture is conveyed from an upstream end of the mixing kneader to a downstream end of the mixing kneader by the continuous conveying action of kneading and transporting elements. Applicants submit that the prior art relied upon by the Office does not disclose or suggest the presently claimed invention. For example, the cited prior art does not disclose the conveyance of a monomer mixture through a mixing kneader by use of the conveying action imparted by the transporting elements of transporting elements attached to the two axially parallel shafts of the mixing kneader.

Applicants draw the Office's attention to new Claim 36 which requires that the process is carried out in a manner so that no heat is removed through water evaporation. At least the Tsubakimoto prior art inherently includes the removal of heat through water evaporation. See for example column 4, lines 24-38:

> The polymerization vessel to be used for this invention is desired to be provided in the upper portion thereof with a lid adapted to permit displacement of the internal gas of the polymerization vessel with an inert gas and, consequently, enable the polymerization system to be retained under an atmosphere inert to the reaction of radical polymerization. Optionally, the polymerization vessel may be provided in the upper portion thereof with a reflux condenser for condensing, during the course of the polymerization, the water vaporized by the heat of polymerization reaction. Otherwise, the polymerization vessel may be adapted so that the water formed as described above will be forced out of the vessel interior by the current of an inert gas introduced into the vessel. For the purpose of heating the aqueous monomer solution or partially removing the heat of polymerization reaction during the polymerization, it is desirable to provide the polymerization vessel with a jacket. Examples of the inert gas usable advantageously herein include nitrogen, carbon dioxide and argon. (Underline added).

With regard to the rejection in view of Tsubakimoto (U.S. 4,625,001), Applicants submit that the cited prior art does not disclose the process of the present claims because Tsubakimoto instead discloses a process that does not use transporting elements for

conveying a monomer mixture through a mixing kneader. For example, Tsubakimoto discloses rotating shafts having only kneading elements. Tsubakimoto does not disclose a mixing device (e.g., a mixing kneader) wherein a monomer mixture is conveyed from an upstream end to a downstream end by the transporting elements on the rotating shafts of the mixing device. Instead, Tsubakimoto discloses the following at column 2, lines 13-18:

> The objects described above are accomplished by a method for the continuous production of a cross-linked polymer, which comprises the steps of continuously feeding the aqueous solution of a monomer capable of being converted by aqueous solution polymerization into a water-containing cross-linked gel polymer and a polymerization initiator to a vessel provided with a plurality of mutually parallel rotating stirring shafts, finely dividing a water-containing gel polymer issuing from the polymerization in progress by the shearing force of stirring blades generated by the rotation of the aforementioned stirring shafts, and continuously discharging the resultant finely divided water-containing gel polymer out of the vessel. (See col. 2, lines 7-20).

Tsubakimoto therefore discloses a device that includes stirring blades on stirring shafts but does not disclose shafts that have transporting elements such as the transporting elements recited in, for example Claims 10 and 26.

The invention claimed in Claim 26 is further different from the process described in Tsubakimoto. The presence of transporting elements on the rotating shafts of the mixing kneader recited in the present claims functions to reduce back mixing in the device (e.g., the mixing kneader). In contrast, Tsubakimoto discloses a process wherein enhanced back mixing is preferred. This is evident, for example, from the disclosure at column 7, lines 47-57:

> Further by the method of this invention, the generation of the heat of polymerization reaction is uniform along the course of time because the finely divided water-containing gel polymer retained within the reaction vessel on the freshly supplied aqueous monomer solution are uniformly mixed and the polymerization of the monomer occurs on the surface of the polymer gels. Thus, the removal of the heat of the polymerization reaction and the maintenance of the temperature

> of the polymerization system at a constant level are easy. (Column 7, lines 47-57).

Contrary to the presently claimed invention which requires that the monomer mixture is conveyed by rotating shafts having transporting elements, the process of Tsubakimoto results in the retention of the monomer mixture within the prior art mixing device.

The figures of Tsubakimoto describe various mixing kneaders (see Figs. 4 and 5). Figure 5 discloses various rotating components of the prior art mixing device. For example, Figure 5 shows a stirring blade as reference no. 26 (see column 5, lines 30 to 35); a discharge screw is identified as reference no. 29; and a paddle feeder is identified as reference no. 30 (see column 5, lines 44-45). A side view of the device of Fig. 5 is provided as Fig. 4 where it is readily evident that the stirring blades are two axially parallel rotating shafts that are used to stir the mixture of Tsubakimoto. The figures of Tsubakimoto do not disclose a mixing device containing two rotating shafts, each having transporting elements. This is in contrast to the claimed invention which requires "at least two axially parallel rotating shafts having a plurality of kneading and transporting elements".

Tsubakimoto even distinguishes the prior art process from other processes as follows:

> The method of this invention is entirely different in operating principle from the method of Japanese Patent Laid-Open No. SHO56(1981)-32514 which causes the materials to be moved in a manner of piston flow from the entrance to the exit...(See col. 8, lines 11-15).

In Tsubakimoto there is significant back-mixing because the axially parallel rotating shafts contain mixing elements and not transporting elements. While these elements may be effective for mixing, they are not effective for transporting a monomer mixture from an upstream end to a downstream end of a mixing device. The Examples of Tsubakimoto further support this interpretation by showing substantially greater residence times than the residence times that are a feature of some of the present dependent claims. For example,

Example 1 of Tsubakimoto has a residence time of 45 minutes in contrast to residence times of 30, 20 and 10 minutes for Claims 30-32.

Further, Claim 29 requires that the axially parallel rotating shafts have L-shaped and/or U-shaped attachments. In contrast, Tsubakimoto discloses rotating shafts that may have, for example, sigma type, S-type, Banbury type or fish-tail type mixing elements. L- or U-shaped transporting elements are not disclosed. Thus, the subject matter of dependent Claim 29 is further patentable over Tsubakimoto.

Applicants traverse the rejection in view of Irie (U.S. 4,920,202). Applicants submit that a process that requires the conveying of a monomer mixture by two axially parallel rotating shafts each having transporting elements cannot be anticipated or rendered obvious by the process described in Irie because the cited prior art does not describe the use of a device having transporting elements for conveying a monomer mixture.

Applicants further draw the Office's attention to previously presented Claims 30-32 wherein the residence time of the monomer mixture is 30 minutes, 20 minutes, and 10 minutes, respectively. Applicants submit that the subject matter of Claims 30-32 is further patentable over Irie on the grounds that Irie discloses examples having a long reaction time (e.g., 60 minutes; see col. 6, line 64) which is indicative of a process that includes significant back-mixing and does not use axially parallel rotating shafts having transporting elements as a means of moving a monomer mixture through the prior art device.

Applicants submit the presently claimed invention is novel and not obvious in view of the prior art of record at least because the prior art does not disclose the use of a mixing device having transporting elements for conveying a monomer mixture from an upstream end to a downstream end of the mixing device. The presently claimed invention is further not obvious in view of the prior art on the grounds that the prior art teaches enhanced back

mixing by the use of stirring elements on rotating shafts instead of the transporting elements of the claimed invention.

Applicants respectfully submit that all now-pending claims are in condition for allowance and request notification of the same from the Office.

Respectfully submitted,

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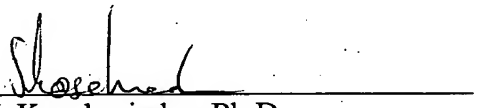

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